

What is claimed:

1. A method comprising:
 - capturing, via an image sensor, a sequence of images of a driver of a vehicle over a time period;
 - detecting a plurality of triangles in the sequence of images, each triangle in the plurality of triangles having vertices corresponding to three facial features of the driver of the vehicle, the three facial features including: a first pupil, a second pupil, and a third feature selected from a group consisting of a nose, a mouth, and a chin;
 - analyzing the detected plurality of triangles in the sequence of images to identify a plurality of surface normals for the detected plurality of triangles; and
 - tracking an eye gaze direction of the driver over the time period by tracking the identified plurality of surface normals for the detected plurality of triangles.
2. The method of claim 1, further comprising:
 - calibrating the image sensor.
3. The method of claim 2, wherein calibrating the image sensor comprises:
 - adjusting the image sensor to account for lighting conditions in the vehicle.
4. The method of claim 2, wherein calibrating the image sensor comprises:
 - capturing a reference image of the driver gazing in a known direction with a known head pose; and
 - analyzing the reference image to detect the three facial features in the reference image;
 wherein detecting the plurality of triangles in the sequence of images includes: identifying, in each of the sequence of images, the three facial features detected in the reference image.
5. The method of claim 4, wherein calibrating the image sensor further comprises:
 - displaying audio or visual instructions to instruct the driver to gaze in the known direction and to assume the known head pose.
6. The method of claim 4, wherein calibrating the image sensor further comprises:
 - estimating that the driver is gazing in the known direction with the known head pose based on an analysis of a distribution of the facial features in one or more previously captured images of the driver;
 wherein analyzing the reference image to detect the three facial features in the reference image occurs in response to estimating that the driver is gazing in the known direction with the known head pose.
7. The method of claim 1, further comprising:
 - generating a report identifying one or more areas to which the tracked eye gaze direction is directed.
8. The method of claim 1, further comprising:
 - generating an alarm when the tracked eye gaze direction is outside of a predefined range of safe gaze directions.
9. A system comprising:
 - an image sensor that captures a sequence of images of a driver of a vehicle over a time period;
 - one or more processors that are communicatively connected to the image sensor and that:
 - (i) detect a plurality of triangles in the sequence of images captured by the image sensor, each triangle in the plurality of triangles having vertices corresponding to three facial features of the driver of the vehicle, the three facial features including: a first pupil, a second pupil, and a third feature selected from a group consisting of a nose, a mouth, and a chin;
 - (ii) analyze the detected plurality of triangles in the sequence of images to identify a plurality of surface normals for the detected plurality of triangles; and
 - (iii) track an eye gaze direction of the driver over the time period by tracking the identified plurality of surface normals for the detected plurality of triangles.
10. The system of claim 9, wherein the image sensor is embedded in a dash or a console of the vehicle.
11. The system of claim 9, wherein the one or more memory devices further comprise instructions to perform a calibration.
12. The system of claim 11, wherein the instructions to perform the calibration comprise instructions to adjust the image sensor to account for lighting conditions in the vehicle.
13. The system of claim 11, wherein the instructions to perform the calibration comprise:
 - instructions to cause the image sensor to capture a reference image of the driver gazing in a known direction with a known head pose; and
 - instructions to analyze the reference image to detect the three facial features in the reference image;
 wherein the instructions to detect the plurality of triangles in the sequence of images includes: instructions to identify, in each of the sequence of images, the three facial features detected in the reference image.
14. The system of claim 13, wherein the instructions to perform the calibration further comprise:
 - instructions display audio or visual instructions to instruct the driver to gaze in the known direction and to assume the known head pose.
15. The system of claim 13, wherein the instructions to perform the calibration further comprise:
 - instructions to estimate that the driver is gazing in the known direction with the known head pose based on an analysis of a distribution of the facial features in one or more previously captured images of the driver;
 wherein the instructions to analyze the reference image to detect the three facial features in the reference image occurs in response to estimating that the driver is gazing in the known direction with the known head pose.
16. The system of claim 9, further comprising a speaker or display communicatively coupled to the one or more processors;
 - wherein the one or more processors generate an alarm via the speaker or display when the tracked eye gaze direction is outside of a predefined range of safe gaze directions.
17. A system comprising:
 - a means for capturing a sequence of images of a driver of a vehicle over a time period;
 - a means for detecting a plurality of triangles in the sequence of images, each triangle in the plurality of triangles having vertices corresponding to three facial features of the driver of the vehicle, the three facial features including: a first pupil, a second pupil, and a third feature selected from a group consisting of a nose, a mouth, and a chin;